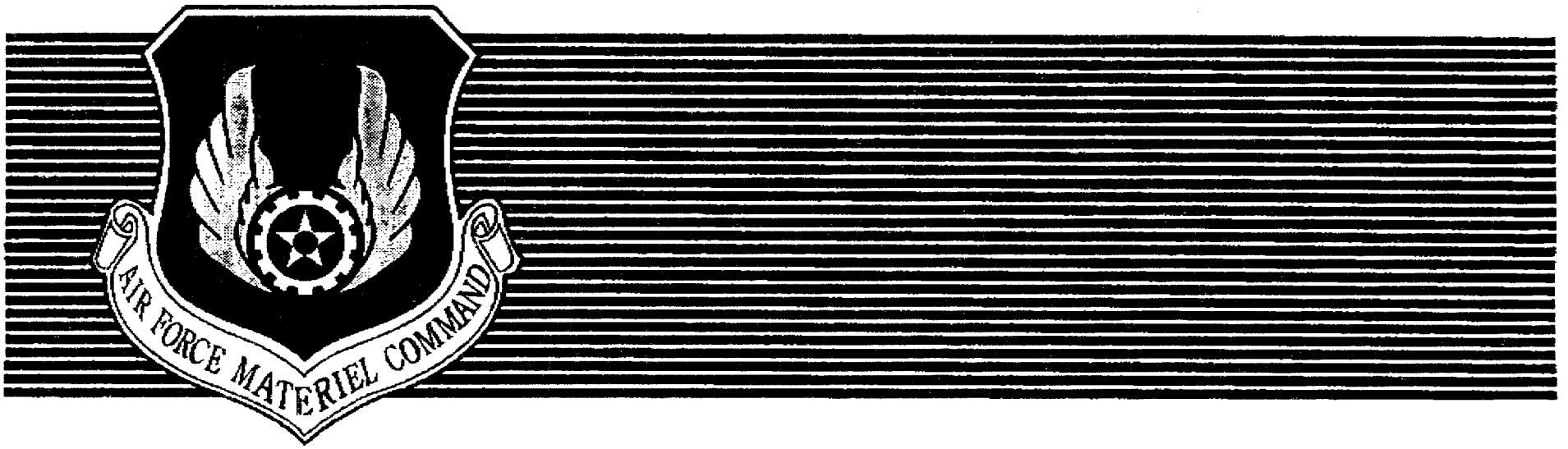

ROME LABORATORY

COMPUTER SECURITY

PRESENTED BY
MR JOSEPH GIORDANO
RL/C3AB
(315) 330-3681

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The objective of this presentation is to develop & demonstrate theTools & technology necessary to realize trusted c31 systems in Air Force & DoD applications, and to emphasize use of formal Verification to assure Securit/Trust Mechanism Satisfies Formal Security/Trust Policy Model.

14. SUBJECT TERMS
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COMPUTERSECURITY

OBJECTIVE: **TO DEVELOP & DEMONSTRATE THE** TOOLS & TECHNOLOGY **NECESSARY TO** REALIZE TRUSTED **C3I** SYSTEMS **IN** AIR FORCE **&** DOD APPLICATIONS

APPROACH: EMPHASIZE **USE** OF FORMAL VERIFICATION **TO** ASSURE **SECURITY/** TRUST MECHANISM SATISFIES **FORMAL** SECURITY/TRUST POLICY MODEL

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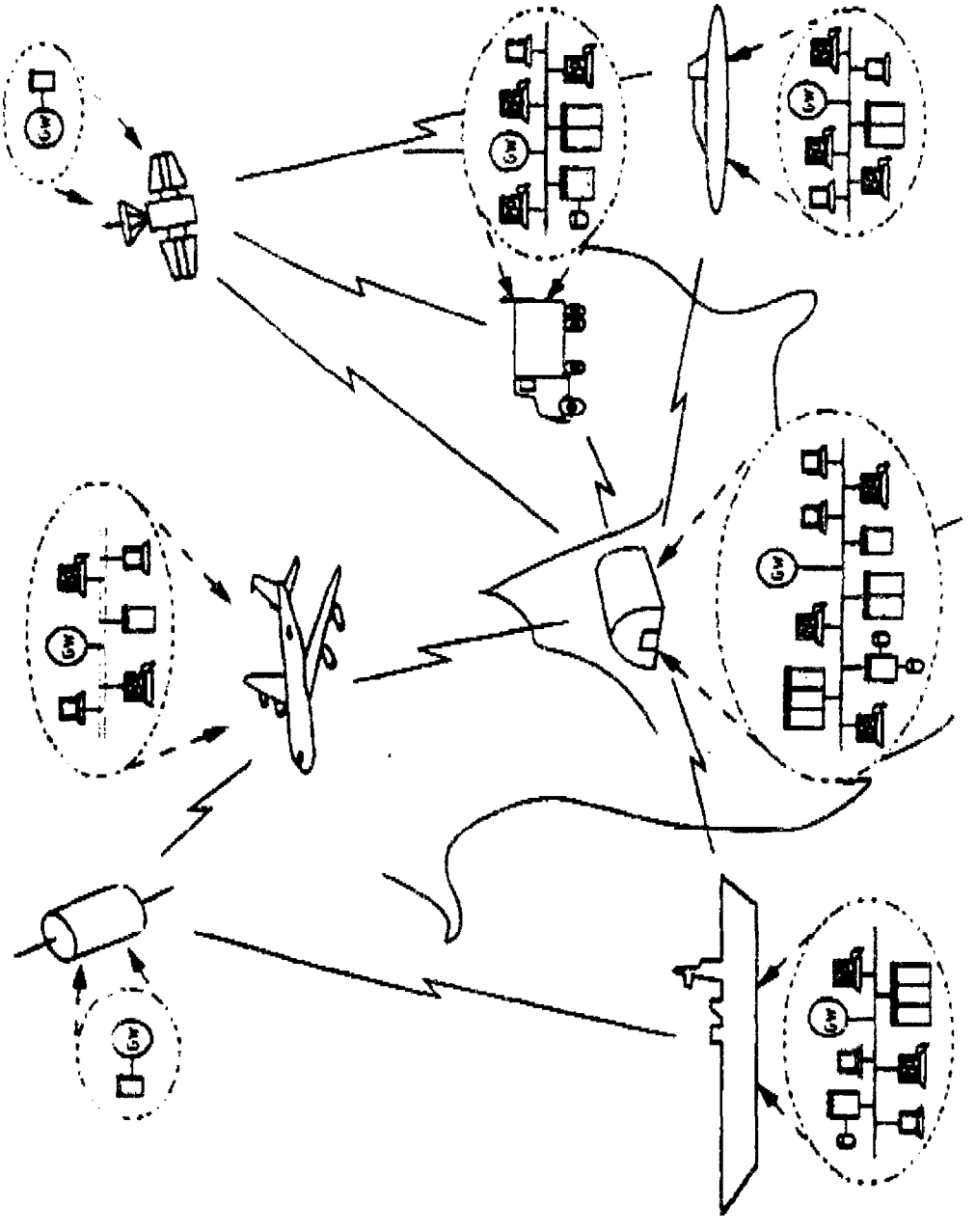
MULTI LEVEL SECURE C2 SYSTEMS



TECHNOLOGY STATUS

	STATE-OF-THE-ART	DEFICIENCIES
POLICY	ACCESS CONTROL	INTEGRITY ASSURED SERVICE
MECHANISMS	OPERATING SYSTEM GUARDS MULTINET GATEWAY	DISTRIBUTED SYSTEMS DATABASE MGMT SYS PARALLEL PROCESSING
VERIFICATION	TESTING PENETRATION DESIGN VERIFICATION	CODE VERIFICATION TRUSTED COMPILERS TRUSTED HARDWARE SOFTWARE ENGINEERING
CERTIFICATION	AD HOC PROCESS LABOR INTENSIVE	STANDARDIZED PROCESS AUTOMATED TOOLS

COMPUTER SECURITY
AREAS OF INTEREST

- SECURITY PROPERTIES **MODELING**
- **SECURE DISTRIBUTED SYSTEMS**
- MULTILEVEL SECURE DBMS
- FORMAL VERIFICATION
- **CERTIFICATION TECHNOLOGY**

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SECURITY PROPERTIES MODELING

ROMULUS

ESTABLISHED CONCEPT OF "HOOK-UP" SECURITY

IMPLEMENTED SECURE SYSTEM DEVELOPMENT ENVIRONMENT ON SUN WORKSTATION

POPULATE ENVIRONMENT WITH GENERIC MODELS OF SECURE SYSTEM COMPONENTS

EXTEND ENVIRONMENT TO ADDRESS:
- DATA INTEGRITY
- ASSURED SERVICE

FORMAL MODELS

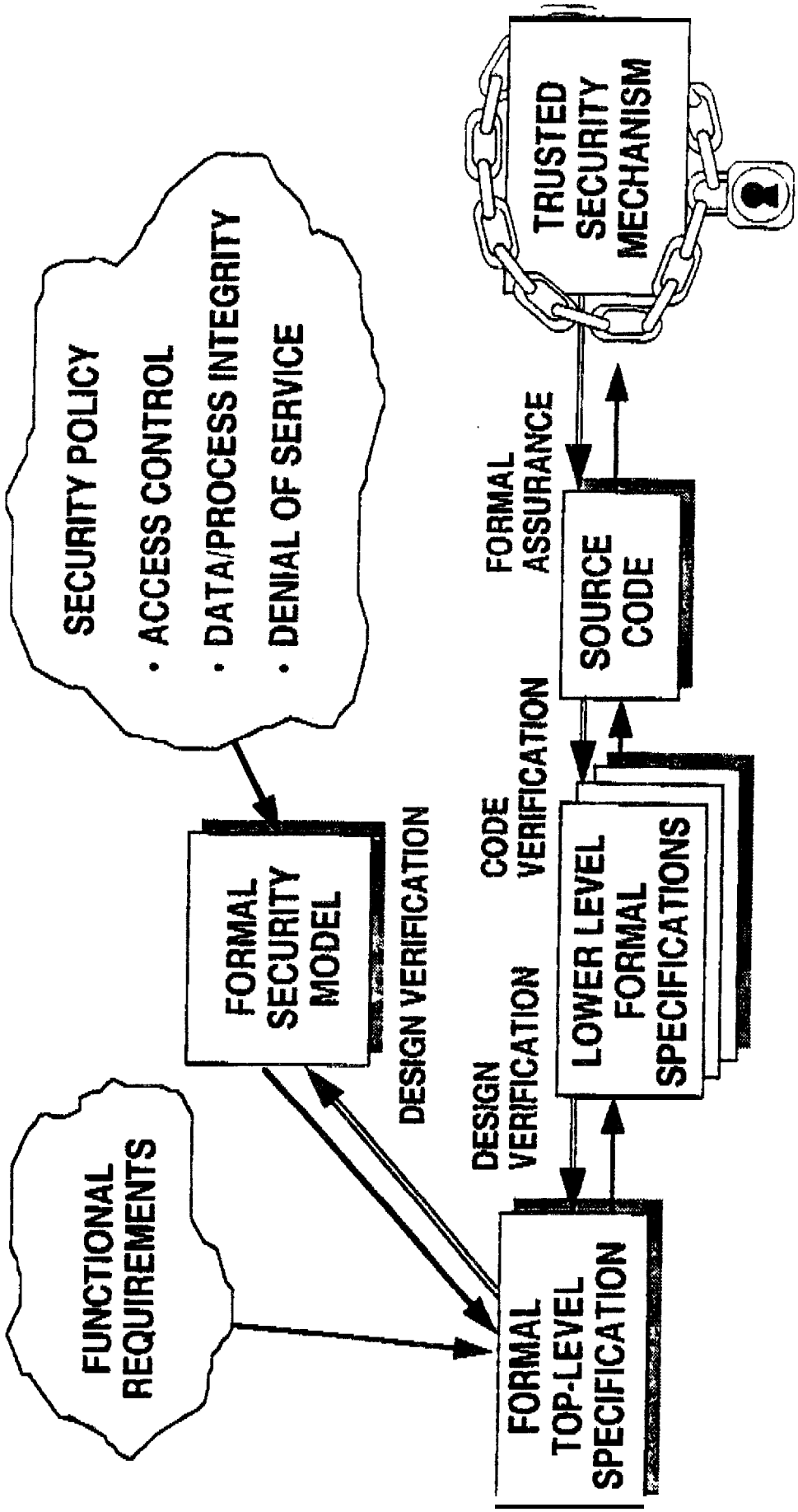
DATABASE INTEGRITY

ASSURED SERVICE FOR DISTRIBUTED SYSTEMS

DATABASE AGGREGATION

DISTRIBUTED SYSTEMS INTEGRITY

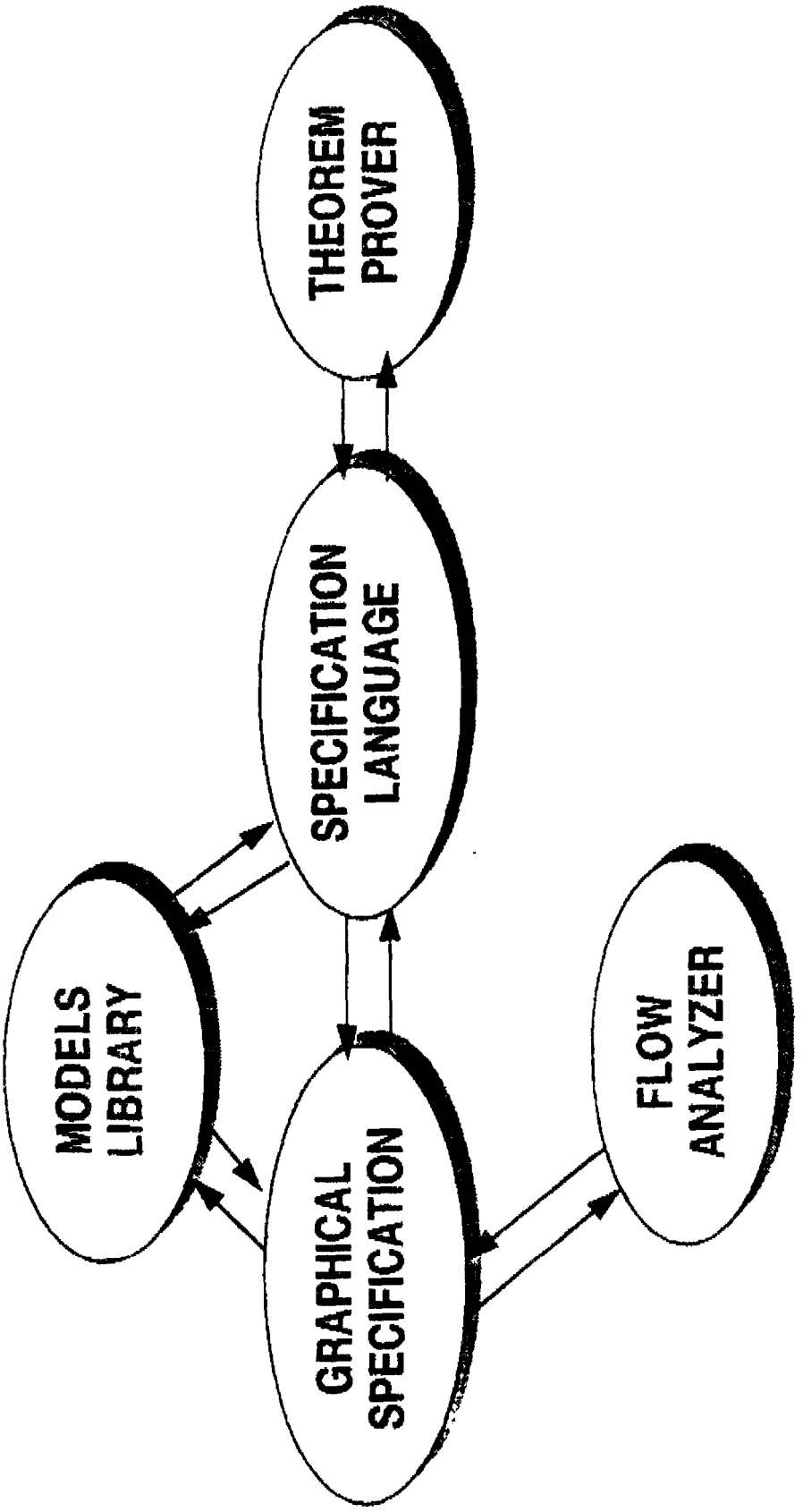
TOP-BOTTOM VERIFICATION



WHAT IS ROMULUS?

ROMULUS IS A WORKSTATION-BASED, TRUSTED SYSTEM DESIGN ENVIRONMENT TO MODEL, ANALYZE, & VERIFY THE SECURITY PROPERTIES OF TRUSTED, DISTRIBUTED COMPUTER SYSTEMS

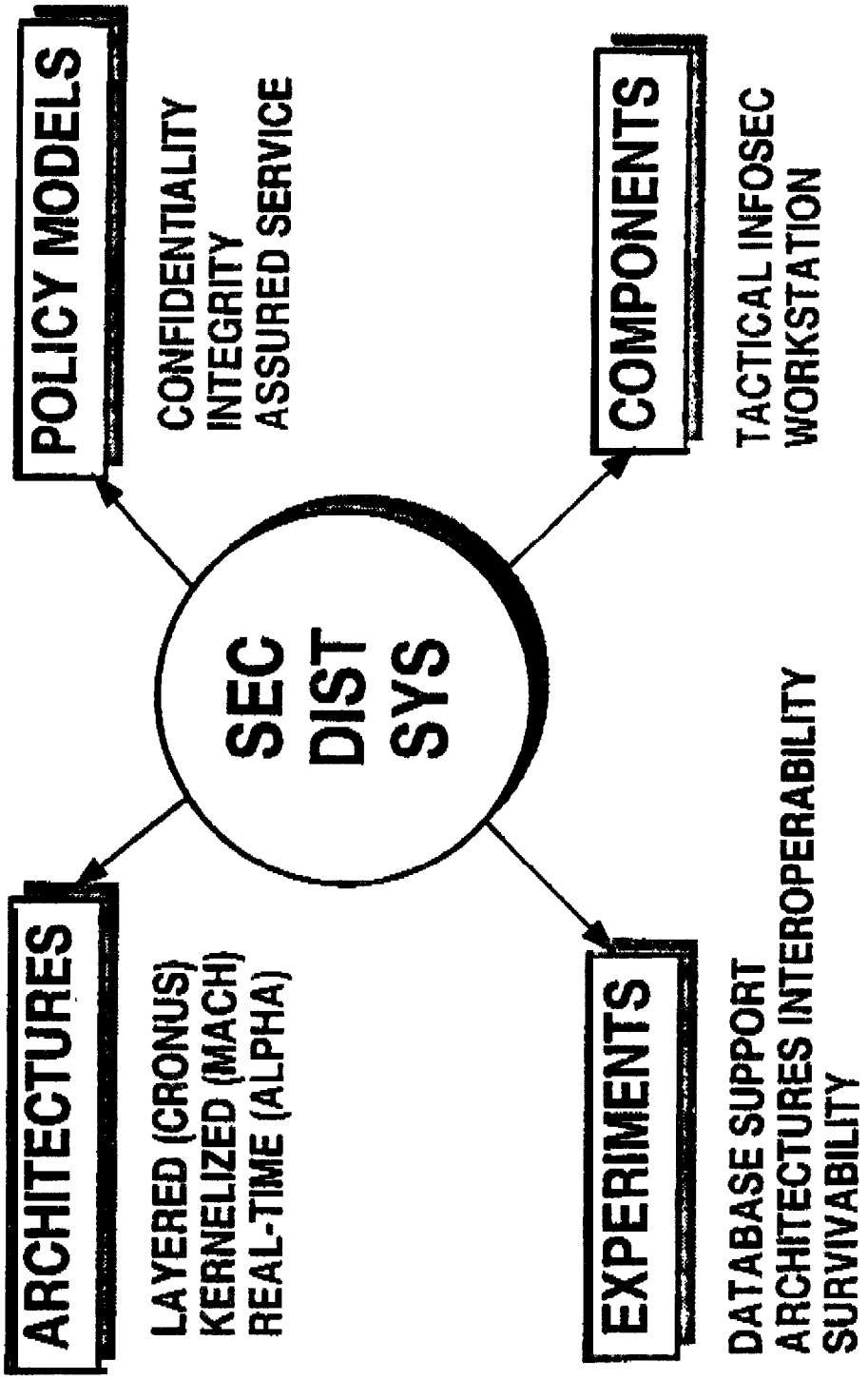
COMPONENTS OF ROMULUS



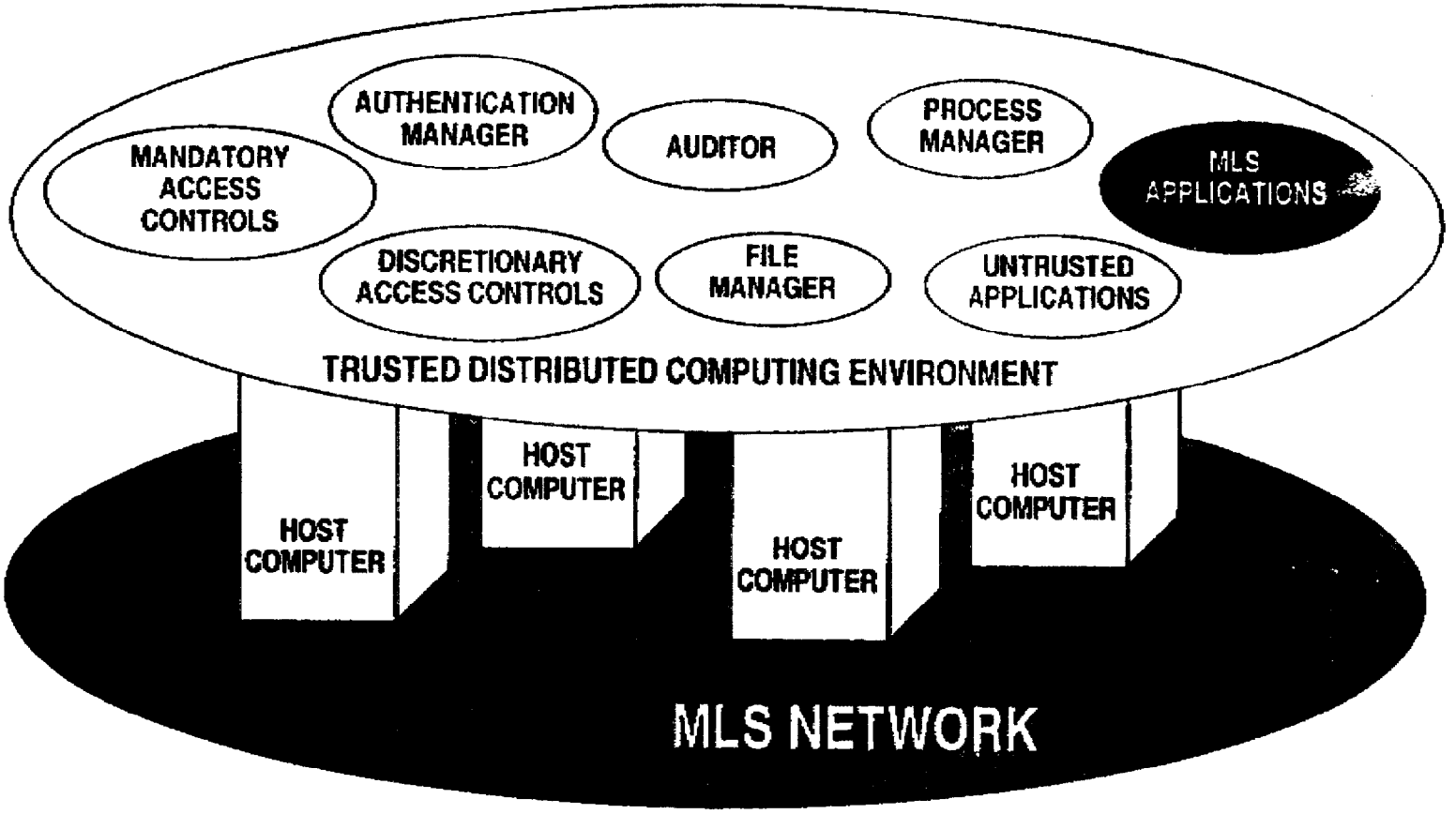
SYSTEM DESIGN WITH ROMULUS

ROMULUS EXTENSIONS

- REQUIREMENTS TOOL INTEGRATION
- ROMULUS/PENELOPE INTEGRATION
- ENHANCED MODELING SUPPORT


POLICY MODELS
CONFIDENTIALITY
INTEGRITY
ASSURED SERVICE
COMPONENTS
TACTICAL INFOSEC
WORKSTATION
SEC
DIST
SYS
ARCHITECTURES
LAYERED (CRONUS)
KERNELIZED (MACH)
REAL-TIME (ALPHA)
EXPERIMENTS
DATABASE SUPPORT
ARCHITECTURES INTEROPERABILITY
SURVIVABILITY

MLS DISTRIBUTED OPERATING SYSTEM



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THETA PROGRAM-HISTORY

- ROME LAB SUPPORT FROM 1985
- CONCEPT EXPLORATION PHASE ("PHASE I"):
  - BBN/ORA, 198547
  - STUDY DISTRIBUTED SECURITY; FORMULATE POLICY
  - DESIGN A SECURE DISTRIBUTED OS
  - CARRY OUT AI-LEVEL VERIFICATION FOR ASSURANCE
- DEMONSTRATION/VALIDATION PHASE ("PHASE II"):
  - ORA/BBN, 1988-92
  - DETAILED DESIGN & POLICY BASED ON PHASE I WORK
  - IMPLEMENT PROTOTYPE
  - B3-LEVEL DESIGN & ASSURANCE

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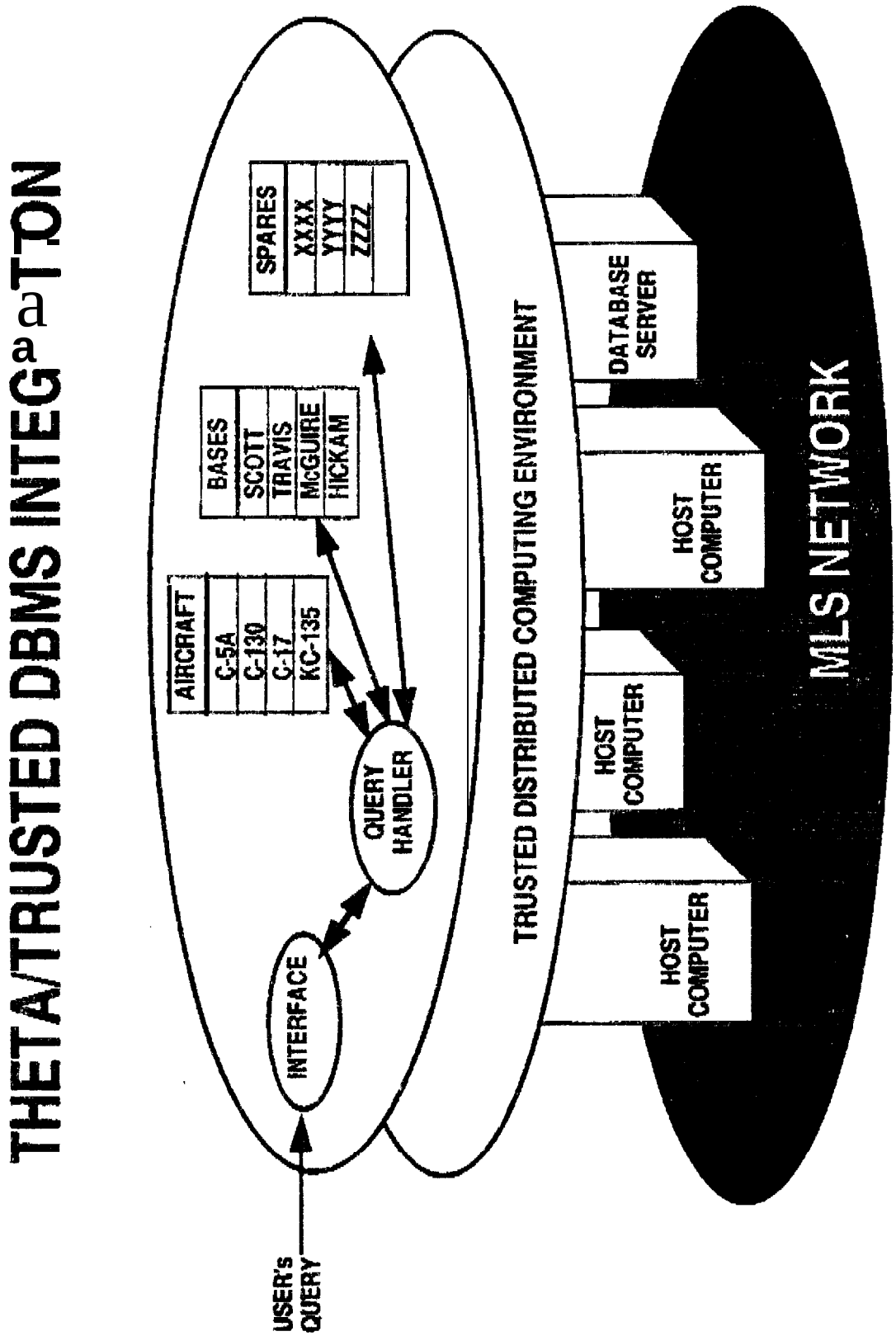
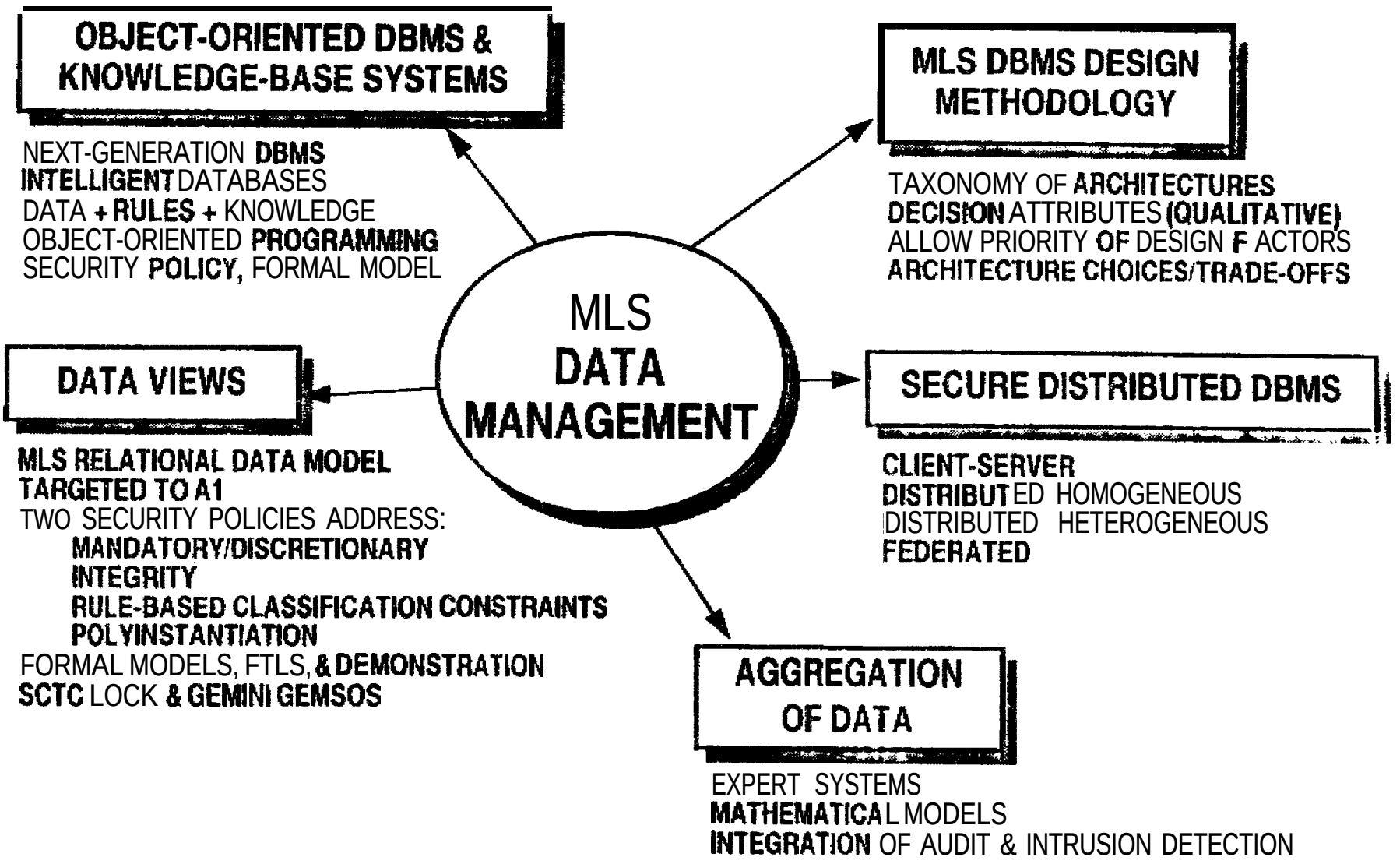
THETA/TRUSTED DBMS INTEGRATION





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TRUSTED DATABASE FRONT-END

OBJECTIVE:

- DEVELOP & DEMONSTRATE TRUSTED DBMS FRONT-END CAPABILITIES TO SUPPORT
  - MULTILEVEL WORKSTATION INTERFACE
  - MULTILEVEL OUTPUT TECHNOLOGY
  - PRESENTATION TECHNOLOGY
  - WINDOWING
  - TRUSTED DATA LABELS

PROGRAM REQUIREMENTS:

- BUILD TO AT LEAST CLASS B2
- TRUSTED SUBJECT APPROACH
- CLIENT-SERVER ARCHITECTURE

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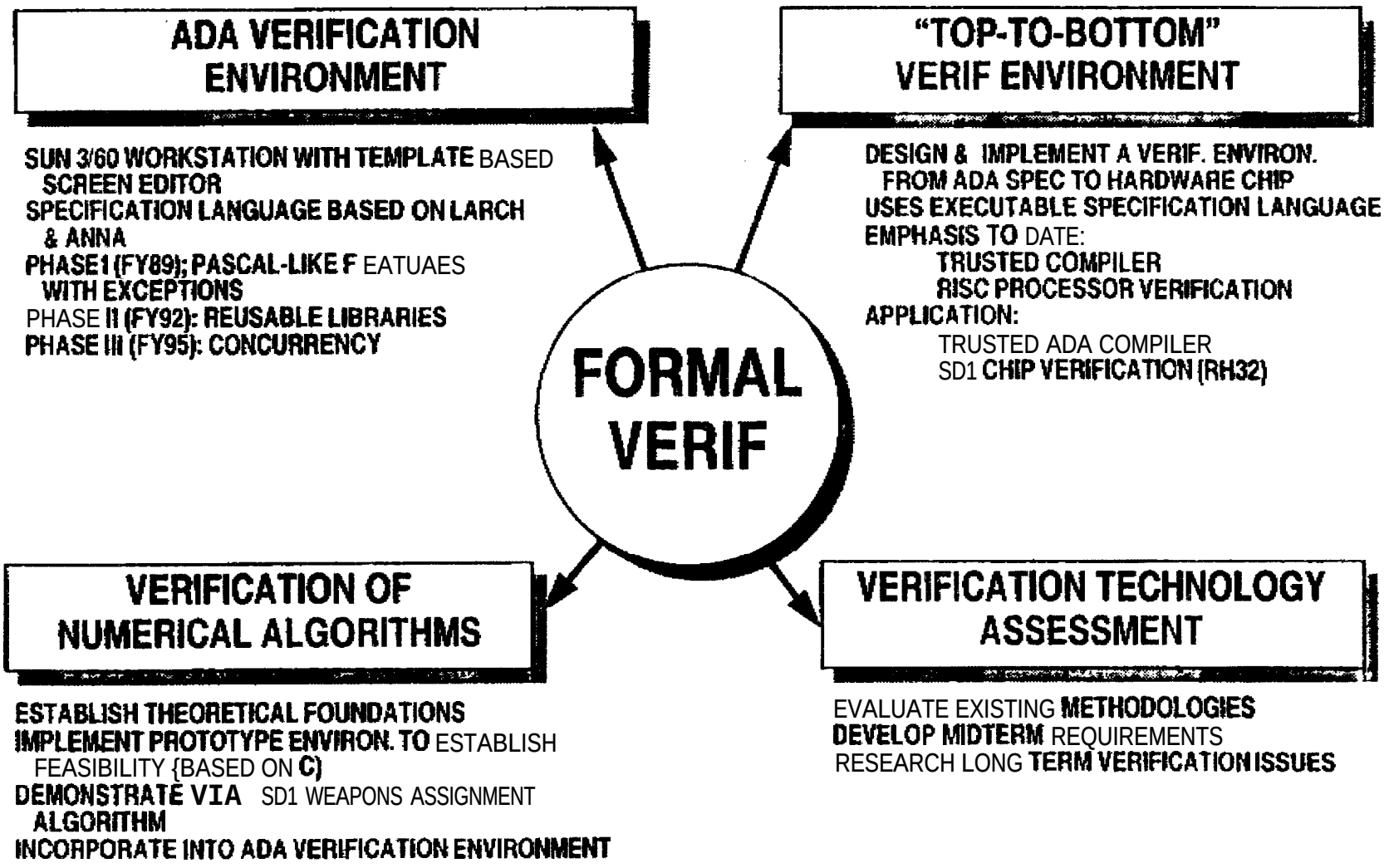

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CERTIFICATION TECHNOLOGY

OBJECTIVE:

DEVELOP A METHODOLOGY & PROVIDE A SET OF TOOLS & TECHNIQUES TO SUPPORT THE SECURE SYSTEM ACCREDITATION/EVALUATION PROCESS & TO AID THE DETERMINATION OF THE DEGREE OF SECURITY PROVIDED BY AUTOMATED INFORMATION SYSTEMS

APPROACH:

- DEFINITIZE EXISTING CERTIFICATION PROCESS
- TAILOR PROCESS TO AIR FORCE NEEDS
- IDENTIFY AREAS AMENABLE TO AUTOMATION
- SURVEY EXISTING TOOLS/TECHNIQUES TO DETERMINE APPLICABILITY TO AIR FORCE SECURITY CERTIFICATION PROCESS
- DEVELOP A METHODOLOGY & NEW TOOLS & TECHNIQUES TO SUPPORT SYSTEM CERTIFICATION & LIFE CYCLE MANAGEMENT

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PROJECTED FY93 NEW STARTS

EFFORT TITLE	POINT OF CONTACT
TRUSTED DATABASE FRONT-END	JOSEPH GIORDANO/x2805
THETA/TRUSTED DBMS INTEGRATION	EMILIE J. SIARKIEWICZ/x3241
ROMULUS EXTENSIONS	JOHN C. FAUST/x3241